

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application. Further, the Applicant respectfully apologizes for any inadvertent misstatements made regarding the prior art.

I. Disposition of Claims

Claims 1, 4, and 5 are pending in this application. Claim 6 has been cancelled by way of this reply. Claim 1 is independent. The remaining claims depend, directly or indirectly, from claim 1. Claim 1 has been amended to more particularly recite the present invention. Claim 7 has been added. No new matter has been added.

Particularly, with respect to claim 1, the criteria for evaluating the performance of the membrane have been amended to correspond to the examples provided in the instant specification.

II. Rejection(s) under 35 U.S.C § 103

Claims 1 and 6 were rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 4,353,802 ("Hara"). Claim 6 has been cancelled, rendering the rejection moot with respect to this claim. As applied to amended claim 1, this rejection is respectfully traversed.

The present invention advantageously provides, in one or more embodiments, a membrane, which removes toxic substances at low pressures, and further, retards the deposition of insoluble ingredients within a high recovery rate (*i.e.*, permeable water quantity/supplied water quantity).

Claim 1 recites, "A highly permeable composite reverse osmosis membrane comprising: a thin film containing an amino group directly connected to an aromatic ring and a microporous support to support the thin film; wherein the thin film is formed through an interfacial polymerization by reacting a polyvinyl alcohol-based aromatic amine compound, and wherein the highly permeable composite reverse osmosis membrane having a salt rejection of no less than 34% and no more than 80%, and a permeable flux of no less than 1.0 m³/m²•d as assessed with a pH 6.5 aqueous solution comprising 500 mg/liter of sodium chloride at an operation pressure of 5 kg/cm² and at a temperature of 25°C." (emphasis added).

The evaluation of the membrane under the claimed testing conditions recited above specifically lends to a membrane having the previously mentioned advantages (e.g., high recovery at low pressures and retardation of depositions of insoluble ingredients, *etc.*).

Hara teaches a semi-permeable composite membrane with high permselectivity and flux, superior flexibility, high resistance to compaction, high resistance to chemical and biological degradation, excellent storability in dry state and superior dry-wet reversibility. (*See* col. 2, ll. 47-52). In other words, Hara teaches a highly permeable membrane, which is very resilient.

The Examiner states that Hara renders the present invention obvious because it generally discloses the conditions of the claim. The Applicant respectfully disagrees with this assertion as applied to amended claim 1. In particular, the Applicant notes that vague generalizations that state "it is useful to obtain the membrane with a *higher* salt-rejection," (col. 13, ll. 30-33), do not render obvious the specific limitations recited by

the present invention. In general, Hara teaches how to increase the salt rejection, rather than controlling the salt rejection to “no more than 80%,” as required by claim 1. In particular, Hara is silent with respect to controlling both the permeable flux and the salt rejection rate within the ranges recited by amended claim 1.

Moreover, the Applicant notes with respect to the *Geisler* decision cited by the Examiner, the Federal Circuit articulated a two-prong test for addressing *prima facie* rejections with respect to ranges. In particular, the Federal Circuit stated that a *prima facie* case of obviousness can be rebutted if the applicant (1) can establish “the existence of unexpected properties in the range claimed” or (2) can show “that the art in any material respect taught away” from the claimed invention. *In re Geisler*, 34 U.S.P.Q. 2d 1362, 1365 (Fed. Cir. 1997).

In his rejection, the Examiner has reduced this two-prong test to the following single statement: “when the difference between the claimed invention and the prior art is the range or value of a particular variable, then a *prima facie* rejection is properly established when the difference in range or value is minor.” The Applicant respectfully notes that this is an improper distillation of the test articulated by the Federal Circuit.

First, unlike the facts presented in the *Geisler* case, the Applicant notes that Hara does explicitly teach away from the claimed invention in a material aspect. In particular, Hara recites that Hara’s invention is significant because it is “useful to obtain the membrane with a *higher* salt-rejection.”

Second, unlike in the *Geisler* case, Hara does *not* disclose *any* embodiments that read on the claimed invention. Therefore, a *prima facie* case does not exist on the basis of the *In re Aller* decision. In particular, Hara is *silent* as to maintaining the salt rejection

rate below 80%, and teaches away from the reference. While the Examiner maintains that the generalizations in Hara about varying the salt rejection and flux properties would be enough to render obvious the claimed invention, the Applicant respectfully notes that these comments should be read within the context of the prior art, and, moreover, notes that an unsupported statement about the knowledge of one of ordinary skill does not set forth a *prima facie* case of obviousness.

Moreover, claim 1 has been amended to recite an aromatic amine compound. The Applicant notes that Hara explicitly teaches away from using an aromatic amine compound in order to achieve high flux rates. With respect to the passage cited by the Examiner, Hara states that “[t]he amino compound of the formula (II-c) [the only aromatic case disclosed] is preferable from a viewpoint that it is useful to obtain the membrane with a high chlorine resistance.” Thus, in actuality, with respect to aromatic amines, Hara discloses high salt rejection rates as opposed to high permeability.

Claims 1 and 4-6 were additionally rejected under 35 U.S.C. §103(a) as being unpatentable over Hara in view of U.S. Patent No. 5, 576,057 (“Hirose”). Claim 6 has been cancelled, rendering the rejection moot with respect to that claim. With respect to amended claim 1, Hirose fails to provide that which Hara lacks.

Hirose teaches a composite reverse osmosis membrane coated by two solutions, where the difference in solubility between the two solutions is in the range of 7 to 15 $(\text{cal}/\text{cm}^3)^{1/2}$.

With respect to Hirose, the Examiner notes that Hirose “explains that by varying proportions of water and ethanol in an amine solution, salt rejection and flux may be varied.” First, the Applicant notes that the amendments to claim 1 (requiring a salt

rejection rate of 34% and a permeation flux of 5.3 or less) remove any overlap between Hirose and claim 1. Second, the Applicant notes that Hirose shows from 0% to 30% ethanol, the salt rejection rate remains essentially the same (99.4%-99.6%). Only in a completely non-aqueous solution (*i.e.*, 100% ethanol) did the salt rejection rate change. From this teaching, one of ordinary skill in the art would not conclude that a desired salt rejection rate can be achieved by varying proportions of water and ethanol in an amine solution, as asserted by the Examiner. Instead, one of ordinary skill in the art would expect that a non-aqueous solution might be required in order to lower the salt rejection rate.

Notwithstanding the fact that Hirose does not suggest varying the salt rejection and flux to fall within the claimed range, the Applicant still fails to see how one of ordinary skill would be able to achieve the claimed rates, without engaging in improper hindsight reconstruction. At a minimum, a large amount of experimentation would have to be done in order to even begin to find appropriate concentrations of ethanol that may achieve the claimed rates, and even then, without the prior art articulating any reason, the Applicant fails to see why one of ordinary skill would be motivated to do so.

Again, as noted above, the amendments to claim 1 remove any overlap between the prior art and the instant invention. Accordingly, no *prima facie* case of obviousness may be maintained simply by nakedly asserting the prior art. The Applicant respectfully asserts that neither of the cited prior art references disclose the rates claimed by the present invention, nor would such rates be obvious in view of that art. Accordingly, claim 1 is patentable over the prior art. Claims 4 and 5, which depend from claim 1, are likewise patentable.

III. Concluding Remarks

Applicant believes this reply to be fully responsive to all outstanding issues and place this application in condition for allowance. If this belief is incorrect, or other issues arise, do not hesitate to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 04558.035002).

Respectfully submitted,

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